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Visitor Attitudes Toward Wilderness Fire Management Policy—1971-84

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RESEARCH SUMMARY

Fire suppression policies of the 20th century have significantly changed the evolution of many landscapes, compared to what would have occurred had natural fires been allowed to continue. Naturally occurring fires are now permitted in many wildernesses and National Parks under specified conditions. The public is often affected by this fire management policy, and needs to be informed about the role and effects of naturally occurring fire in wilderness settings.

Several studies suggest growing public acceptance of policies which manage fire rather than suppress it, particularly in wilderness settings. Trends in attitudes and knowledge levels have, however, not been investigated. Public attitude towards manager-ignited fires have not been investigated either. This study was designed to replicate an earlier study (1971) of visitors to the Selway-Bitterroot Wilderness to determine if attitudes and knowledge levels have changed.

Visitors using four trailheads on the eastern side of the wilderness were sampled. Each visitor completing a special registration card was sent a mail-return questionnaire. The final sample size totaled 274 people, reflecting an 83 percent response.

Compared to the earlier study, respondents were more knowledgeable about natural fire effects: the average correct score on the 11-item fire effects quiz was 64 percent; it was 53 percent in 1971. Most visitors preferred some type of fire management policy; the earlier study reported a majority of visitors preferring fire suppression.

About half the visitors felt that manager-ignited fires would be beneficial to the wilderness; about 16 percent thought that such fires would be detrimental; and about one-third were unsure of the effect. Individuals who felt that manager-ignited fires would be beneficial cited specific reasons for their feelings, such as benefits to wildlife, reduced fire hazard, and so on. Those unsure or feeling such fires would be detrimental did so because they thought fire in wilderness should be natural or were concerned about loss of animals.

The study also investigated factors associated with attitudes and knowledge levels. The relationship between fire management attitudes and fire effects knowledge was relatively strong (gamma = 0.51). Level of educational attainment and previous experience in the Selway-Bitterroot Wilderness were significantly associated with knowledge levels.

The data suggest that visitors to this wilderness are more supportive of managing naturally occurring fires than they were in 1971. Those with favorable attitudes toward manager-ignited fires tend to cite reasons not dependent on wilderness values. Those opposing these types of fires did so because they feel they interfere with natural processes. The study results suggest the need for more public discussion of the rationale and philosophy of manager-ignited fires.

The data also suggest that information given to the public may be helpful in increasing knowledge levels and changing attitudes. While no specific cause-effect relationships were studied, it appears that the more liberal attitude of visitors to this wilderness toward fire management may be partly due to the amount of information available in the local area.

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INTRODUCTION

The historical role of naturally occurring fire in shaping the character of many American landscapes has become an accepted ecological principle. Prior to the coming of the Europeans, natural fires had a major influence in producing a variety of vegetational mosaics. Fire suppression policies of the 20th century, however, significantly changed the evolution of many landscapes compared to what would have occurred had natural fires been allowed to continue. Although natural fires can no longer be allowed to burn in many places because of resource values or danger to the public, such fires may be permitted in many wildernesses and National Parks under specified conditions—if they achieve certain objectives.

Land managers and researchers acknowledge the validity of these prescribed fires, but what does the public think of the idea? Such a question is important because the public is affected by fire management policy—directly through closures of areas and trails, decreased visibility, and increased air pollution due to smoke during a fire, and indirectly through changes in the landscape and resulting effects on wildlife populations. In his discussion of the major philosophical aspects of this issue, Worf (1985) emphasizes that public awareness is important in gaining support for the use of fire in wilderness. The public is affected by fire management policies, and it should be informed and educated about the role and effects of naturally occurring fire in wilderness settings.

Disseminating information about fire's natural role and effects is an important step in establishing public support. In 1971, a study of visitors to the Selway-Bitterroot Wilderness showed that knowledge of fire effects was positively associated with attitudes toward fire management (Stankey 1976). Most respondents favored some type of fire suppression policy rather than a more liberal policy allowing fires to burn under certain conditions. Levels of knowledge were generally quite low. Stankey found that the average correct score on an 11-item fire effects test was only 53 percent. Since the time of the Stankey study, land-managing agencies have expended considerable effort in providing information to the public about the role of fire in shaping the landscape. One objective of this effort has been to increase the level of recognition and public acceptance of the natural role of fire. Have such efforts succeeded? Is the public more knowledgeable about the effects of fire? Are wilderness users more willing to accept fire management policies that permit lightning fires to burn as prescribed fires rather than suppressing them all as wildfires?

A review of the literature suggests that public acceptance of fire as a management tool is growing. Whereas the literature review conducted by Stankey in 1976 revealed virtually no studies that examined public attitudes toward fire management, the topic has been the focus of several recent investigations. For example, Taylor and Daniel (1984) reported that respondents considered burned forests visually acceptable under certain conditions, particularly when lightly burned. Cortner and others (1984) found considerable support for policies favoring prescribed fire rather than complete suppression in the Tucson, AZ, area. These cross-sectional studies suggest significant changes in visitor knowledge and attitudes toward fire suppression policies during the last decade.

Specific trend information about changes in attitudes or knowledge about natural fire is less readily available. Lucas (1985) indicates that visitors to the Bob Marshall Wilderness in 1982 were more supportive of allowing natural fires to burn than those he studied in 1970. But his study did not investigate knowledge levels. Because an understanding of public knowledge levels about the role of fire and the trend in this understanding is important for developing public information programs and evaluating their effectiveness, we initiated a study designed specifically to examine these issues.

METHODS

The research reported here replicates in content and method the Stankey study of Selway-Bitterroot Wilderness users in order to determine trends. In the current study, summer visitors were selected from those registering at four trailheads on the eastern side of the Wilderness. The trailheads ranged in use levels from very heavy to very light. A total of 330 visitors were sent a mail-return questionnaire, followed by a postcard reminder 1 week later, and a second questionnaire 2 weeks after the postcard. A total of 275, or 83 percent of those sampled, responded to the study. In 1971, Stankey sampled visitors to the same wilderness but included some fall visitors as well as summer visitors. His initial sample was 217. The mail-return questionnaire yielded an 84 percent return rate, for a net sample size of 183. Despite some sampling differences, the two studies are similar in terms of the population studied.

To test knowledge, a series of 11 statements were developed about the role and effects of naturally occurring fire in the Northern Rocky Mountains. Respondents were asked to check each statement as "basically true," "basically false, or, if uncertain, "not sure." The 11 statements are shown with the correct answer underlined in figure 1. Correct answers were based on consultation with scientists at the Intermountain Fire Sciences Laboratory, Missoula, MT.

Respondents were presented with a list of nine different policy statements about wildfire in wilderness (fig. 2). These statements ranged from advocating suppression of all fires to advocating no suppression whatever. The statements were based on the Sherif and others' (1965) social judgment approach to measuring attitudes.

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1. Forest fires usually result in the death of the majority of the animals in the area.

   Basically True **Basically False** Not Sure

2. Most forest fires in the Northern Rocky Mountains are started by lightning.

   Basically True Basically False Not Sure

3. Past forest fires have not changed the way in which the Northern Rocky Mountain forests developed.

   Basically True **Basically False** Not Sure

4. The elimination of forest fire in the Northern Rockies would result in a change in the kinds of plants and animals found in the area.

   Basically True Basically False Not Sure

5. Complete control of all forest fires would reduce the habitat of animals such as elk.

   Basically True Basically False Not Sure

6. The majority of forest fires that occurred in the Rocky Mountains before the pioneers covered hundreds of thousands of acres.

   Basically True **Basically False** Not Sure

7. Fire often proves useful in making minerals and nutrients available to plants and trees.

   Basically True Basically False Not Sure

8. Some kinds of trees found in Northern Rocky Mountain forests would gradually disappear over time if all fires were eliminated.

   Basically True Basically False Not Sure

9. Forest fire can be an important force in controlling outbreaks of disease and insects in forests.

   Basically True Basically False Not Sure

10. Intensive fire control has actually increased rather than reduced the chances of a very large fire occurring.

    Basically True Basically False Not Sure

11. Forest fires are partly responsible for some of the open meadows and grassy fields one finds in the Northern Rocky Mountains.

    Basically True Basically False Not Sure

Figure 1.—True-false test to determine level of knowledge about the role of fire in the Northern Rocky Mountains used in 1971 and 1984 (correct answer underlined).

A. It is absolutely necessary that all forest fires be put out as soon as possible in our wilderness areas.

B. It would probably be best if all forest fires were put out as soon as possible in our wilderness areas.

C. Generally, it would be preferable if all forest fires in wilderness were put out as soon as possible.

D. It is hard to decide what the policy toward forest fires in wilderness should be, but probably they should be put out as soon as possible.

E. It is hard to decide whether we should allow forest fires to burn in our wilderness areas or not.

F. It is hard to decide what the policy toward forest fires in wilderness should be, but probably we should allow small, "safe" ones to burn.

G. Generally, it would be preferable if small, "safe" forest fires were allowed to burn in our wilderness areas.

H. It would probably be best if most forest fires were allowed to burn in our wilderness areas.

I. It is absolutely necessary that we allow all forest fires to burn in our wilderness areas.

Figure 2.—Alternative wilderness fire suppression statements included in both 1971 and 1984 studies.

Respondents were asked to indicate which statement most nearly matched their own personal opinion, other statements which they found acceptable, and the one statement that they considered most objectionable.

RESULTS AND DISCUSSION

Have knowledge levels shifted in the 13 years between studies? Table 1 shows the results of the fire effects quiz for both years. As mentioned, the average correct score was 53 percent in the first study. In 1984 the average correct score was 64 percent, an 11 percent increase and an indication that current wilderness users are more knowledgeable about fire effects. Nevertheless, as table 1 shows, the changes in knowledge levels were not consistent on all questions. For some questions there was little increase in reported knowledge levels, while the changes were dramatic for others. For example, most visitors in both years were unable to correctly answer the question (6) about the size of natural fires. Yet there was a major increase in the percentage of correct answers dealing with the influence of fire on nutrient cycling. Table 2 shows the distribution of test scores among the categories used by Stankey. Note there has been nearly a 50 percent decline in the percentage of individuals scoring in the very lowest category and a major increase in the percentage of people scoring in the highest two categories.

Table 1.—Percentage responding correctly to fire knowledge test items for 1971 and 1984[1]

Question (answer)	Percentage responding correctly 1971	1984
1. Forest fires usually result in the death of the majority of the animals in the area. (F)	52	51
2. Most forest fires in the Northern Rocky Mountains are started by lightning. (T)	63	63
3. Past forest fires have not changed the way in which the Northern Rocky Mountain forests developed. (F)	66	62
4. The elimination of forest fire in the Northern Rockies would result in a change in the kinds of plants and animals found in the area. (T)	55	71**
5. Complete control of all forest fire would reduce the habitat of animals such as elk. (T)	50	59*
6. The majority of forest fires that occurred in the Rocky Mountains before the pioneers covered hundreds of thousands of acres. (F)	23	26
7. Fire often proves useful in making minerals and nutrients available to plants and trees. (T)	55	79**
8. Some kinds of trees found in Northern Rocky Mountain forests would gradually disappear over time if all fires were eliminated. (T)	53	67**
9. Forest fire can be an important force in controlling outbreaks of disease and insects in forests. (T)	67	84**
10. Intensive fire control has actually increased rather than reduced the chances of a very large fire occurring. (T)	40	58**
11. Forest fires are partly responsible for some of the open meadows and grassy fields one finds in the Northern Rocky Mountains. (T)	54	63*

[1] *Difference in percentage answering question correctly statistically significant at $\alpha = 0.10$.
**Difference in percentage answering question correctly statistically significant at $\alpha = 0.05$.

Table 2.—Test score distribution by year, in percentage ($\chi^2 = 23.25$, $\alpha = 0.001$)

Score	1971	1984
	----- *Percent* -----	
0 – 35	22.1	12.2
36 – 44	9.9	9.9
45 – 54	9.9	7.6
55 – 64	16.6	12.9
65 – 72	15.5	11.8
73 – 81	11.0	14.4
82 – 91	13.3	24.0
92+	1.7	7.2

Table 3 shows a corresponding shift in attitudes toward fire management. This table indicates which of nine fire management policies respondents found most acceptable. In 1971 the majority (56 percent) of the users questioned favored a fire suppression approach (statements A through D). The 1984 study indicates only about 17 percent supported these policies, and only 5 percent supported complete suppression. Interestingly, only a small percentage in either year supported a policy of completely letting all fires burn, suggesting that visitors remain unwilling to support extreme positions. Over 70 percent of the 1984 sample, however, supported a policy of allowing fires to burn in wilderness (statements F through I).

Table 3.—Most acceptable fire management policy by year in percentage, rounded to nearest whole number ($\chi^2 = 75.00$, $\alpha = 0.001$)

Attitude	1971	1984
	----- *Percent* -----	
A (most restrictive)	31	5
B	8	4
C	8	4
D	9	4
E	4	8
F	13	23
G	18	23
H	7	26
I (most permissive)	2	1
	100	98

Respondents were also asked to indicate the one statement they found most objectionable. In 1984, the only two statements found objectionable by more than 2 or 3 percent of the sample were the two extreme positions. In 1971, many respondents found other intermediate fire management policies objectionable.

An issue of growing concern is the deliberate use of prescribed fire to achieve wilderness objectives: should wilderness managers deliberately ignite some fires in the wilderness? A prescribed fire ignited by the manager is set at a predetermined time to achieve a predetermined objective. How do wilderness users feel about this type of fire management policy?

The 1984 study asked two questions about the use of prescribed fire. Because Cortner and others (1984) had demonstrated that awareness of prescribed fire was associated with approval of its use, we first asked respondents if they were aware of the use of prescribed fire in areas outside wilderness. About two-thirds of our respondents had heard of the practice, in distinct contrast to the Cortner and others study where the figure was 84 percent. Our 1984 study also asked respondents if they believed "using prescribed fire (igniting the forest under strict supervision of management) in some wilderness areas" would be detrimental or beneficial. Nearly 50 percent felt that such human-ignited prescribed fires would be beneficial; slightly more than one-third indicated they were "unsure"; only 16 percent felt that such fires would be detrimental. Of those aware of the practice of prescribed fire outside wilderness, 27 percent were unsure of the effects of human-ignited prescribed fires in wilderness. This is in contrast to those who were unaware of prescribed burning: 51 percent were unsure of the effects of human-ignited prescribed fires in wilderness. Interestingly, less than 4 percent of the respondents unaware of prescribed burning practices outside wilderness believed that such fires would be detrimental, while more than 22 percent of those aware of this practice in areas outside wilderness thought prescribed fires in wilderness detrimental.

Respondents were asked to explain their beliefs about human-ignited prescribed fires in wilderness. Table 4 shows the major responses. For those who believed that results would be beneficial, the most frequently cited reasons included reduced fire hazard, improved wildlife habitat, the creation of openings in the forest, better pest control, and restoring fire to its natural ecological role. Those who felt that such a fire policy would be detrimental indicated that the importance of maintaining natural processes through a natural fire policy was a concern. Individuals who were unsure of their feelings stated that they needed more information about the conditions that would guide human-ignited prescribed fires

Table 4.—Study (1984) respondents' reasons for believing that planned ignition may be beneficial, detrimental, or "unsure," in percentage

Reason	Beneficial	Detrimental	Unsure
	---------- *Percent* ----------		
Reduced fire hazard	27.4		1.6
Improved wildlife habitat	37.6		1.6
Creates openings	20.5		
Restore fire to natural role	12.8		3.1
Pest control	8.5		
Stimulates growth	7.7		
Nutrient release	8.5		
Wilderness should be natural	.9	40.0	12.5
Loss of animals		10.0	4.7
Possible mismanagement		10.0	1.6
Natural fire best	1.7	27.5	6.3

and that wilderness areas should be places for natural processes. In general, it seems that those who oppose or are unsure about prescribed fires ignited by managers are concerned about the intrusion of such a policy into the operation of natural processes. Those who favor prescribed fires from human ignition do so less on philosophical grounds than on the specific benefits to the resource they see. This pattern of reasoning has important ramifications that we will elaborate on later.

Factors Associated with Attitudes

In the 1971 study, the only significant variable found to be related to attitudes toward fire policy was the level of knowledge about fire effects. Stankey found a gamma of 0.57 between fire effects knowledge and selection of a policy as most acceptable. In the current study, we also found a high level of association, a gamma of 0.51. Both results suggest the critical role information can play in influencing how people feel about fire management.

How do other factors influence attitudes? We examined how age, educational attainment, and previous experience in the Selway-Bitterroot were associated with attitudes and knowledge levels. In addition, we were interested in how particular expectations about the wilderness recreation experience were associated with attitudes and knowledge. Specifically, we wanted to know whether individuals who thought that learning about nature (Driver 1977) was important scored high on the fire effects test. Likewise, the association between attitudes and the importance of learning about nature was of interest.

Spearman's rank order correlation coefficient was used to identify associations among age, education, and knowledge. Although the correlation between age and knowledge was significant at $\alpha = 0.05$, it was so low (0.09) as to have little practical utility. The correlation between educational attainment and fire effects knowledge, however, was considerably higher (0.31). Respondent's previous experience in the Selway-Bitterroot was also associated with knowledge levels, as follows:

Previous visits	Mean score
	Percent
Yes	64
No	54
Total visits	
1 — 3	53
4 — 7	64
8 — 12	69
> 12	69

Differences among experience levels are statistically significant at $\alpha = 0.05$.

Individuals were asked to indicate how important learning about nature was to their wilderness experience. Two items were used to measure this:

1. To learn more about nature.
2. To understand the natural world better.

Respondents were asked to indicate how important each was, on a scale of (1)—not at all important to (6)—extremely important, when they were planning their wilderness trip. The scale had a Cronback's alpha reliability coefficient of 0.85. The average score on this scale for the whole sample was 4.2, indicating that this was a moderately important motivation. When correlated with knowledge level, however, the Spearman's rank order correlation coefficient was only 0.11. Although statistically significant, the coefficient has little practical usefulness. When correlated with attitudes toward fire management, the coefficient was lower (0.05), and not significant. As shown in table 5, attitudes toward human-ignited prescribed fires in wilderness are also related to knowledge of fire effects. Nevertheless, those with the highest scores on the fire effects test exhibited a considerable uncertainty about the consequences of human-ignited prescribed fires in wilderness settings. These individuals might be responding to this question in terms of the philosophical values of fire in wilderness more than the direct effects of such prescribed fires.

In summary, previous experience in the Selway-Bitterroot Wilderness, age, and educational attainment were associated with level of knowledge about fire effects. Knowledge about fire effects and awareness of the use of prescribed fire, however, were strongly associated with attitudes toward wilderness prescribed fire policies. The motivation of learning about nature was not meaningfully associated with either knowledge levels or attitudes toward fire management. This might have been because the average score on this scale was relatively high, thereby eliminating the variance needed for a high correlation, or it might have been because the items were not good measures.

Table 5.—Association between knowledge of fire effects and attitude toward planned ignition in wilderness, in percentage, 1984 study ($\chi^2 = 27.87$, $\alpha = 0.015$)

Fire test score	Beneficial	Detrimental	Unsure
		Percent	
0 — 35	27.6	10.3	62.1
36 — 43	28.6	23.8	47.6
44 — 54	47.4	15.8	36.8
55 — 63	46.9	9.4	43.8
64 — 72	51.6	9.7	38.7
73 — 81	57.9	15.8	26.3
82 — 91	61.7	23.3	15.0
92 — 100	44.4	16.7	38.9

CONCLUSIONS

The data indicate that Selway-Bitterroot Wilderness users are more knowledgeable about fire effects than they were 13 years ago. Their attitudes toward fire management also exhibit significantly more acceptance of allowing some fires to burn in wilderness. This study did not attempt to link such changes to specific information sources or campaigns. Wilderness managers for the Selway-Bitterroot, however, have attempted to provide considerable information to residents in the local area and to wilderness users. One of the first fires allowed to burn in a Forest Service wilderness occurred in the Selway-Bitterroot. This fire, and later fires and their

effects, received considerable publicity. Although we cannot establish a cause-effect relationship, the results indicate that knowledge levels have increased and attitudes have become more supportive with regard to the role of fire in wilderness, changes possibly linked to the increased amount of information made available over the past decade.

The findings with respect to experience are noteworthy and do have management implications. Experience levels in wilderness in general seem to be increasing, suggesting that visitors will become more knowledgeable about the resource, including various aspects of natural fire occurrence and effects. It is not clear whether this is because increased experience in wilderness promotes a greater awareness of, and sensitivity to, the influence of fire in natural systems or because increased experience leads people to seek out more information to promote their understanding of the area. Both explanations probably play a role. Whatever the reason, increased experience levels imply that visitors will be more supportive of allowing some natural fires to burn under prescription.

Our data indicate that those favoring a more liberal fire policy (management-ignited prescribed fires) expect specific benefits. But many of the benefits cited are incidental to the area's management as wilderness. For example, such fires in wilderness will probably improve wildlife habitat or reduce the potential for damage to outside property and resources; however, the main goal is restoration of natural processes. The fact that fire might result in these outcomes could build pressures to burn it to achieve nonwilderness-dependent objectives, a concern that led Worf (1985) to seriously question manager-ignited fires. Our data suggest that many users might expect fire to be used to achieve nonwilderness goals. Managers will need to carefully scrutinize any proposed human-ignited prescribed fires to make sure they satisfy wilderness-dependent purposes. Whether the support for human-ignited prescribed fires will be translated into political support is another issue. In our study, those who were unsure of the effects of prescribed burning or who thought it would be "detrimental," appeared to do so on philosophical grounds rather than because of possible negative effects to the resource itself. Again, Worf (1985) argued that such issues need to be resolved before implementing prescribed fires.

The data also indicate where information campaigns can be more specifically focused. There is a need for more information about the size of natural fires, wildlife mortality, ecological effects of fire suppression, and the capability of natural fire to create forest openings.

This study does not allow direct measurement of the effects of information on knowledge and attitudes. We can only infer that more information and more detailed information lead to greater public understanding about the role of fire. Useful research projects would be to compare the effects of different information treatments on knowledge and attitudes of wilderness visitors and also the general public. The results of such studies would be helpful in designing future information programs, particularly with regard to the type, detail, and timing of information presented to different target audiences.

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Visitors to the Selway-Bitterroot Wilderness, MT, were asked about their knowledge of fire effects and attitudes toward fire management in wilderness settings. In comparison to a similar 1971 study, visitors were more knowledgeable about fire effects and more supportive of fire management rather than fire suppression. About half the visitors felt that manager-ignited fires would be beneficial to wilderness, about 16 percent felt these fires would be detrimental, and about one-third were unsure.

KEYWORDS: wilderness fire management, wilderness policy, visitor attitudes

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